# EXHIBIT 13

**IN THE UNITED STATES DISTRICT COURT**
**FOR THE EASTERN DISTRICT OF TEXAS**
**MARSHALL DIVISION**

| | |
|---|---|
| **TQ DELTA, LLC,**<br>*Plaintiff*,<br>v.<br>**COMMSCOPE HOLDING COMPANY, INC., COMMSCOPE INC., ARRIS INTERNATIONAL LIMITED, ARRIS GLOBAL LTD., ARRIS US HOLDINGS, INC., ARRIS SOLUTIONS, INC., ARRIS TECHNOLOGY, INC., and ARRIS ENTERPRISES, LLC,**<br>*Defendants*. | CIV. A. NO. 2:21-CV-310-JRG<br>(Lead Case) |
| **TQ DELTA, LLC,**<br>*Plaintiff*,<br>v.<br>**NOKIA CORP., NOKIA SOLUTIONS AND NETWORKS OY, and NOKIA OF AMERICA CORP.,**<br>*Defendants*. | CIV. A. NO. 2:21-CV-309-JRG<br>(Member Case) |
| **NOKIA OF AMERICA CORP.,**<br>*Third-Party Plaintiff*,<br>v.<br>**BROADCOM CORP., BROADCOM INC., and AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LTD.,**<br>*Third-Party Defendants*. | |

**DECLARATION OF BRUCE MCNAIR**
**REGARDING CLAIM CONSTRUCTION**

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## I. INTRODUCTION

1. My name is Bruce McNair, and I have been retained as a technical expert by counsel for Defendants Nokia of America Corporation, Nokia Corporation, Nokia Solutions and Networks Oy (collectively, "Nokia") and CommScope Holding Company, Inc., CommScope Inc., ARRIS US Holdings, Inc., ARRIS Solutions, Inc., ARRIS Technology, Inc., and ARRIS Enterprises, LLC (collectively, "CommScope") (together, "Defendants") to address certain issues concerning U.S. Patent No. 7,570,686 (the "Family 1 Patent," or the "'686 Patent"), U.S. Patent No. 8,594,162 (the "'162 Patent"), U.S. Patent No. 10,567,112 (the "'112 Patent"), and U.S. Patent No. 8,462,835 (the "'835 Patent") (collectively, the "Family 6 Patents"), whichhave been asserted by TQ Delta, LLC ("Plaintiff" or "TQ Delta"). Unless otherwise stated, the matters contained in this declaration are of my own personal knowledge and, if called as a witness, I could and would testify competently and truthfully with regard to the matters set forth herein.

2. My opinions are based on my years of education, research and experience, as well as my investigation and study of relevant materials. A list of materials considered is included in **Appendix A** to my declaration.

3. I may rely upon these materials, my knowledge and experience, and/or additional materials, documents, and information in forming any opinions in this Action, including but not limited to opinions to rebut arguments raised by Plaintiff. I reserve all rights that I may have to supplement this declaration if further information becomes available or if I am asked to consider additional information. Furthermore, I reserve all rights that I may have to consider and comment on any additional expert statements or testimony of Plaintiff's experts in this matter.

4. My analysis of materials relevant to this Action is ongoing, and I may continue to review new material as it becomes available. This declaration represents only those opinions I

have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information and on my continuing analysis of the materials already provided. I also reserve the right to create exhibits to use in Court if called upon to testify.

5. I am being compensated at my usual consulting rate of $650 per hour for my time spent working on issues in this case. My compensation does not depend upon the outcome of this matter or the opinions I express.

## II. QUALIFICATIONS

6. I have summarized in this section my educational background, industry experience, and other relevant qualifications. A true and accurate copy of my curriculum vitae is attached as **Exhibit B** to this declaration.

### A. Education

7. I received my Bachelors of Engineering (Electrical) from Stevens Institute of Technology in 1971 and my Masters of Electrical Engineering from Stevens in 1974. I have taken numerous PhD-level courses in Electrical Engineering, Computer Engineering, and Computer Science at Stevens, as well.

### B. Industry Experience

8. I was employed by the U.S. Army Electronics Command at Fort Monmouth, NJ, from 1971 to 1973 and 1974 to 1978 where I worked with voice, data, and wireless communications systems.

9. In 1973, I was employed by ITT Defense Communications Division in Nutley, NJ, where I designed digital hardware and computer software to investigate signal processing of speech signals and transmission of satellite communications signals using advanced forward error correction schemes.

10. From 1978 to 2002, I was employed by AT&T Bell Laboratories and AT&T Laboratories at various New Jersey locations. My work there involved public data networks, high-speed digital communications over analog networks, speech processing, network security, and wireless communications. Several of my positions were closely associated with the subject matter of asserted patents. In particular, while I was in the Bell Labs Data Communications Laboratory in the early 1980s, I worked on high-speed analog modems using techniques that others in the organization later applied to DSL signaling. John Cioffi, one of the inventors of cited prior art, was one of the other members of the group I was in. Rich Gitlin, who was the supervisor of that group and later the head of the same department, is the recognized inventor of the initial concept of DSL technologies for the local telephone plant. Later in my AT&T/Bell Labs career (1994-2002) I investigated the use of Orthogonal Frequency Division Multiplexing (OFDM) for wireless communications. OFDM forms the basis for DSL communications, although the characteristics of a wireless network environment make communications far more difficult than the relatively benign DSL environment. My research in OFDM for wireless applications included the use of interleaving, forward error correction, synchronization, and Reed-Solomon codes.

**C. Publications**

11. My list of publications is shown in my curriculum vitae, listed in **Exhibit B**, but I highlight a few that are closely related to the subject matter of the asserted patents: At VTC00, I presented results from an experimental implementation of OFDM in a wireless environment. I presented further results for this OFDM system at the Sarnoff Symposium in 2001. Seven more of my papers also relate to OFDM.

**D. Prior Expert Testimony**

12. A complete list of cases in which I have testified at trial, hearing, or by deposition

within the preceding five years is in **Exhibit C** to my declaration.

13. Based on my education and experience, I believe I am qualified to render the opinions set forth here.

## III. SCOPE OF OPINIONS

14. I have been asked to provide opinions regarding the meaning of certain disputed claim terms as understood by one of ordinary skill at the time of the claimed inventions. My opinions are based on my understanding of the disputed claim terms and proposed construction and the evidence relied upon by the parties.

## IV. LEGAL STANDARDS

15. Certain legal principles that relate to my opinions have been explained to me by counsel.

16. I understand that ultimately the Court will determine how specific terms shall be construed. The intent of this declaration is to help inform the Court how a person of ordinary skill in the art would have understood the meaning of certain disputed claim terms at the time of the claimed inventions in the context of the Asserted Patents' claims, specifications, and prosecution histories in a manner that will assist the Court in the process of construing the claims. I understand that patent claims are generally given the meaning that the terms would have to a person of ordinary skill in the art in question as of the earliest claimed priority date. It is my understanding that a patentee can act as its own lexicographer by defining a term, in the patent specification, to have specific meaning. It is my understanding that statements made to the patent office by the patentee or its legal representative during prosecution can serve to illuminate, or possibly narrow the proper scope of claim terms, and that such statements must be considered when construing the claim terms. This is sometimes referred to as disclaimer. I have

taken into account these principles in my analysis.

17. I understand that a claim is indefinite if, when read in light of the specification and its prosecution history, the claim fails to inform, with reasonable certainty, those skilled in the art about the scope of the claimed invention.

18. I understand that a patent may include both independent and dependent claims. I understand that a claim in dependent form must contain reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form must be construed to incorporate by reference all the limitations of the claim on which it depends.

## V. BACKGROUND

### A. The Family 1 Patent

19. I have been asked to provide opinions regarding the meaning of certain claim terms in the '686 Patent.

20. The '686 Patent is titled "Systems and Methods for Establishing a Diagnostic Transmission Mode and Communicating Over the Same."

21. I understand that TQ Delta has asserted the following claims and priority dates:

| Patent | Asserted Claims | Asserted Priority Date |
|---|---|---|
| '686 Patent | 17, 18, 36, 37, 40 | January 7, 2000, or, in the alternative, August 10, 2000, or, in the alternative, January 8, 2001. |

22. I have been asked to assume the applicability of the priority date for this patent as detailed above and have therefore analyzed the claim constructions and knowledge of one of ordinary skill for the patent as of those dates.

23. Digital Subscriber Line (DSL) is a technology that developed from research into

analog modems in the early 1980s. As signal processing technology advanced while refinements in communications theory and error correction coding allowed higher and higher transmission speeds, it was recognized that there were two fundamental limitations to being able to send information at high speeds: noise and bandwidth. Transmission bandwidth limits the rate at which signals can be modified (modulated) while allowing reliable detection of the transmitted signals. Noise limits the number of distinct signal levels that can be reliably transmitted while allowing the receiver to reliably determine which particular signal was sent in a certain time slot. As my colleagues and I in the Bell Labs Digital Communications Laboratory, John Cioffi among them, researched techniques to send information at higher data rates, we recognized that there was a fundamental limit to transmission in the local loop (the transmission line between the customer premises and the central office), while long distance transmission had a different set of restrictions. The study of DSL recognized that, if the limitations in the local loop could be separated from the issues in the long distance network, higher-speed, reliable communications were possible. If the short-distance transmission through the local loop could be conquered, the evolving high-speed long-distance digital network could carry the high-speed transmission the rest of the way to the destination.

24. By the late 1980s to early 1990s, key aspects of Discrete Multi-Tone ("DMT") DSL had been developed by John Cioffi and his colleagues at Stanford and AT&T Bell Labs. Discrete multitone (DMT) had been deployed as a multi-carrier modulation scheme to allocate available spectrum for various DSL networks. The conventional DMT transceivers decompose the available frequencies/bandwidth into separate subchannels as specified by the recognized standards. This static infrastructure lead to an inefficient use of the available resources of the network when the transmitted traffic requires only part of the whole allocated spectrum. DMT

makes use of the available frequencies that can be transmitted on the telephone line and splits them into 256/512 equal sized frequency bins of 4.3125 kHz each. Sub-channels (or carrier bins) are where data bits are transmitted to and from our modem. Each sub-channel within a specific frequency range will be responsible for either upstream or downstream data.

25. By the time of the priority date of the Family 1 patents, multiple DSL standards had been developed and put into operation, including the T1.413-1995 and T1.413-1998 ADSL standards developed by the T1E1.4 committee of the American National Standards Institute (ANSI) and the ITU-T G.992.1 and G.992.3 ADSL and ADSL2 standards developed by SG15/Q4 of the ITU.

26. To enable a DSL service provider to monitor the health of an ongoing ADSL connection and troubleshoot issues, all of the ADSL standards in force as of the priority date of the ’686 patent specify mechanisms to retrieve, during Showtime, ADSL transceiver status information and performance monitoring parameters.

27. Specifically, each of the ADSL standards defines an embedded operations channel (EOC) to allow the ATU-C and ATU-R to communicate status information and performance monitoring parameters. T1.413-1995 at § 11.1; T1.413-1998 at § 8.1; G.992.1 at § 9.1; G.992.2 at § 8.1. Using the EOC, the ATU-C can send commands to the ATU-R to read from data registers the ATU-R maintains to store status information or performance-monitoring parameters. T1.413-1995 at § 11.1.3; T1.413-1998 at § 8.1.3; G.992.1 at § 9.2.3; G.992.2 at § 8.3.5. In response, the ATU-R sends the requested information using the EOC messaging protocol. T1.413-1995 at § 11.1.4.3.1; T1.413-1998 at § 8.1.5.3.1; G.992.1 at 9.2.5.3.1; G.992.2 at § 8.4. The EOC messaging protocol includes substantial redundancy to ensure that commands from the ATU-C and responses from the ATU-R are received correctly. *See, e.g.*, T1.413-1995 at

§ 11.1.4.3.1 (ATU-R repeats transmissions until ATU-C has received three consecutive and identical frames); T1.413-1998 at § 8.1.5.3.1 (same); G.992.1 at § 9.2.5.3.1 (same); G.992.2 at § 8.4.2.3 (same).

28. The '686 patent discloses systems and methods for exchanging diagnostic and test information between transceivers over a digital subscriber line. '686 patent at Abstract. FIG. 2 of the '686 patent, copied below, is a flowchart outlining an exemplary method for communicating diagnostic information according to the '686 patent. *Id.* at 3:12-15.

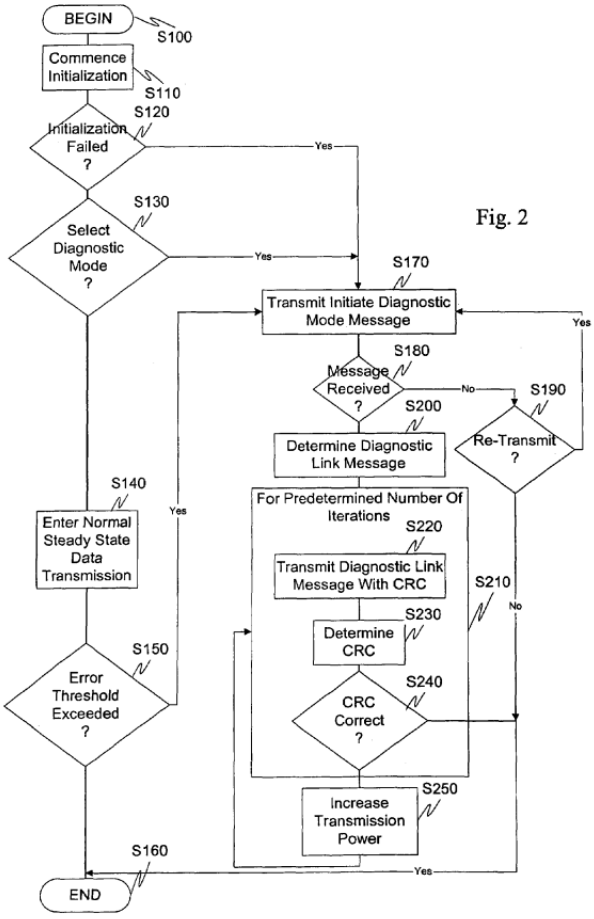


Fig. 2

29. The diagnostic and test information can include information about specific limitations of the modems, information relating to the modem installation and deployment environment, or other diagnostic and test information that can be determined as needed to help to

determine the cause of a failure or problem. *Id.* at 2:35-50. The diagnostic and test information can also include information "that has been assembled during, for example, the normal ADSL initialization procedure." *Id.* at 5:64-66. The '686 patent provides examples of diagnostic and test information, including the following in Table 1:

TABLE 1

| Exemplary Message Variables |
|---|
| Data Sent in the Diag Link |
| Train Type |
| ADSL Standard |
| Chip Type |
| Vendor ID |
| Code Version |
| Average Reverb Received Signal |
| Programmable gain amplifier (PGA) Gain - Training |
| Programmable gain amplifier PGA Gain - Showtime |
| Filter Present during Idle Channel Calculation |
| Average Idle Channel Noise |
| Signal to Noise during Training |
| Signal to Noise during Showtime |
| Bits and Gains |
| Data Rate |
| Framing Mode |
| Margin |
| Reed-Solomon Coding Gain |
| QAM Usage |
| Frequency Domain Equalizer (FDQ) Coefficients |
| Gain Scale |
| Time domain equalizer (TDQ) Coefficients |
| Digital Echo Canceller (DEC) Coefficients |

30. The remote terminal (RT) can send a data message containing data variables to the central office (CO). *Id.* at 4:25-35. As used herein, the RT is located at a subscriber residence and is referred to elsewhere in the '686 patent as an ATU-R, and the CO is located in a central location and is referred to as an ATU-C. The '686 patent discloses three ways in which the RT may send the diagnostic and test information: (a) by using a one-bit-per-DMT-symbol message encoding scheme "as is used in the C-Rates1 message in the ITU and ANSI ADSL standards," (b) by using "Differential Phase Shift Keying (DPSK) on a subset or all of the carriers, as specified in, for example, ITU standard G.994.1," or (c) by using "higher order QAM modulation (>1 bit per carrier)." *Id.* at 3:50-53. These methods are used due to their robust nature and ability to be transmitted in the presence of large amounts of noise and other disturbances. *Id.* at 3:54-67.

31. The ’686 patent discloses that diagnostic and test information can be exchanged by the ATU-C and ATU-R during the normal steady-state communications mode, and during a “diagnostic link mode” that can be used “if the ATU-C and/or ATU-R modem fail to complete an initialization sequence, and are thus unable to enter a normal steady state communications mode, where the diagnostic and test information would normally be exchanged.” Id. at 2:22-26. The diagnostic link mode allows the ATU-C and ATU-R to “exchange the diagnostic and test information that is, for example, used by a technician to determine the cause of a failure without the technician having to physically visit, i.e., a truckroll to, the remote site to collect data.” *Id.* at 2:29-34. An asserted claim of the ’686 patent is claim 17, which recites:

> An information storage media comprising instructions that when executed communicate diagnostic information over a communication channel using multicarrier modulation comprising:
>
> instructions that when executed direct a transceiver to receive or transmit an initiate diagnostic mode message; and
>
> instructions that when executed transmit a diagnostic message from the transceiver using multicarrier modulation, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel and each bit in the diagnostic message is mapped to at least one DMT symbol, and wherein one variable comprises an array representing frequency domain received idle channel noise information.

*Id.* at Claim 17.

**B. The Family 6 Patents**

32. I have been asked to provide opinions regarding the meaning of certain claim terms in the Family 6 Patents.

33. The Family 6 Patents are titled “Impulse Noise Management.”

34. I understand that TQ Delta has asserted the following claims and priority dates:

| Patent[1] | Asserted Claims | Asserted Priority Date |
|---|---|---|
| '162 Patent | 8, 9, 11 | January 7, 2000, or, in the alternative, August 10, 2000, or, in the alternative, January 8, 2001. |
| '112 Patent | 8, 10, 11, 12, 14 | March 3, 2004 or, in the alternative, March 24, 2004, or, in the alternative, March 3, 2005, or in the alternative, April 28, 2010, or, in the alternative, June 11, 2003 |
| '835 Patent | 8, 10, 24, 26 | March 3, 2004 or, in the alternative, March 24, 2004, or, in the alternative, March 3, 2005, or in the alternative, April 28, 2010, or, in the alternative, June 11, 2003 |

35. I have been asked to assume the applicability of the priority dates for these patents as detailed above and have therefore analyzed the claim constructions and knowledge of one of ordinary skill for the patent as of those dates.

36. In forming the opinions set forth in this declaration, I have reviewed the asserted Family 6 Patents and their file histories.

37. The Family 6 Patents generally relate to impulse noise protection adaptation. '162 Patent at 1:23-24. The Family 6 Patents explain that "[c]ommunications systems often operate in environments that produce impulse noise. Impulse noise is a short-term burst of noise that is higher than the normal noise that typically exists in a communication channel." '162 Patent at 1:29-32. For example, DSL systems may encounter impulse noise. '162 Patent at 1:32-36. Impulse noise protection is managed through interleaving and Forward Error Correction (FEC), but as of the time of the Family 6 Patents, the "current xDSL procedure at least [did] not provide

[1] The '162 Patent is only asserted against Nokia. The '835 Patent is only asserted against CommScope. The '112 Patent is asserted against both Nokia and CommScope.

specific states to enable training for the selection of the appropriate interleaving and FEC parameters." '162 Patent at 1:42-46.

38. At the time of the Family 6 Patents, the "current technique" for selecting interleaving and FEC parameters "include[d] the steps of an operator . . . configuring the ADSL connection with a specific noise protection value, the ADSL connection [being] initialized and the transceivers enter[ing] into steady state data transmission (i.e., Showtime), and if the connection is stable, i.e., error-free, then the service is acceptable and the process ends." '162 Patent at 2:41-47. But "if there are bit errors, then the process is repeated with the operator . . . configuring the ADSL connection with another specific INP value." '162 Patent at 2:47-49.

39. The Family 6 Patents describe that the system of the alleged invention can transition from one "FEC and Interleaving Parameter (FIP) setting" "to another FIP setting without going through the startup initialization procedure such as the startup initialization sequence utilized in traditional xDSL systems." '162 Patent at 3:30-44.

40. With respect to the background of the invention, I reserve the right to respond to TQ Delta's expert's description should a more detailed description of the background of the technology become necessary.

## VI. LEVEL OF ORDINARY SKILL IN THE ART

41. I have been asked to offer my opinion regarding the level of ordinary skill in the art with respect to each of the Asserted Patents.

42. In my opinion, with regard to the '686 patent, a person having ordinary skill in the art at the time of the alleged inventions of the Asserted Patents would have possessed a bachelor's degree in electrical or computer engineering, or the equivalent, and at least 5–6 years of experience in telecommunications or a related field; a master's degree in electrical or

computer engineering, or the equivalent, and at least 2–3 years of experience in telecommunications or a related field; or a Ph.D. in electrical or computer engineering, or the equivalent, with at least 1–2 years of experience in telecommunications or a related field. As of the time of the invention of the various patents through the present, I qualify as a person of ordinary skill in the art.

## VII. DISPUTED CLAIM TERMS

43. I have been asked to provide opinions as to the terms and issues identified below and the claims associated with those terms.

### A. Family 1 Patent

#### 1. "each bit in the diagnostic message is mapped to [at least one / one] DMT symbol"

| Claim(s) | Plaintiff's Position | Defendants' Position |
|---|---|---|
| '686 Patent, Claims 17, 36, 40 | Plain and ordinary meaning. No construction necessary. | Indefinite |

44. I understand that the parties dispute the construction of "each bit in the diagnostic message is mapped to [at least one / one] DMT symbol," which is in the above-listed claims of the '686 Patent. I understand that the Plaintiff contends that this term should be afforded its "[p]lain and ordinary meaning. No construction necessary." Having considered the parties' positions, I agree with Defendants' position.

45. This term is indefinite. Indeed, a person of ordinary skill in the art would not understand the meaning of the phrases "mapped" or "at least one" / "one" as used in the asserted limitation.

46. As an initial matter, the term "mapped" is a jargon term that would not provide a person of skill in the art with reasonable certainty as to what is intended by this phrase in the

context of the claim. Specifically, the term "mapped" could mean that the same bit value is represented by one symbol, two symbols, or every symbol that results from a given DMT signal. A person of skill in the art would understand that you have to define a mapping function with specificity in order to implement that particular function.

47. The specification contains a single description of the term "mapped." The specification discloses "[i]n the one bit per DMT symbol modulation message encoding scheme, a bit with value 0 is mapped to the REVERB1 signal and a bit with a value of l mapped to a SEGUE1 signal." '686 patent at col. 3:54-57. But the language used in the specification references mapping to a particular *signal*, not a symbol, and provides no insight as to what it means to map a bit of the diagnostic message to a symbol.

48. Further, this disclosure of mapping does not tell us anything about mapping a bit of the *diagnostic message*. The REVERB1 and SEGUE1 signals are instead only relevant to the state of the communication protocol, and are not part of the diagnostic message.

49. Next, the phrases "at least one" and "one" are both indefinite as they are used in the claims. While "one" is clear, the term "at least one" allows for the scenario that a given bit is mapped to more than one DMT signal. As described below, the different possible interpretations tied to each version of the claim further adds to the indefinite nature of the term.

50. With respect to "at least one," a person of ordinary skill in the art would not understand how a bit in a message could be "mapped" to more than one DMT symbol. Indeed, as described above, the discussion within the specification of the "one bit per DMT symbol modulation scheme," '686 patent at 3:54-67, does not disclose that any particular bit is mapped to *more* than one DMT *symbol*. The claim language would raise a number of questions in the mind of one of ordinary skill in the art. For example, a person of skill in the art may question 1)

whether there is some error coding used to map a bit into several redundant symbols, 2) whether the same bit is sent multiple times, once in each symbol, or 3) whether the claim language contemplates something else entirely.

51. With respect to "one," were a person of ordinary skill in the art to, in the alternative, interpret "one DMT symbol" to refer to the transmission of a bit, they would not understand how a bit, when transmitted, is transmitted for only one DMT symbol period. A person of ordinary skill in the art would understand that a DMT symbol includes transmission at multiple frequencies. It is not clear how a bit of data would be mapped to all of the subcarriers of a symbol. Stated differently, the symbol could consist of multiple subcarriers and a person of ordinary skill would not know how and to which of the subcarriers the data is mapped.

52. A person having ordinary skill at the time of the alleged invention would have been familiar with and understood the G.992.1 Recommendation. G.992.1 consistently states that signals, including the initialization signals using REVERB1 and SEGUE1, span multiple DMT symbol periods—and requires that any signals that are limited in duration be expressly defined as limited in duration. For example, section 10.1.1 of G.992.1 states:

> The description of a signal will consist of three parts:
>
> * * *
>
> The second is a statement of the required duration, expressed in DMT symbol periods, of the signal. This signal duration may be a constant or may depend upon the detected signaling state of the far-end transceiver. The duration of a single DMT symbol period depends on whether the cyclic prefix is being used; some initialization signals contain a cyclic prefix, and some do not. ATU-C signals up to and including C-SEGUE1 are transmitted without a cyclic prefix; those from C-RATES1 on are transmitted with a prefix. Similarly, ATU-R signals up to and including R-SEGUE1 do not use a prefix; those from R-REVERB3 onward do. The duration of any signal in seconds is therefore the defined number of DMT symbol periods times the duration of the DMT symbol being used.

ITU-T Recommendation G.992.1 at § 10.1.1 (emphasis added). Section 10.4.5 describes the signal C-REVERB1, which is transmitted by the ATU-C:

> C-REVERB1 is a signal that allows the ATU-C and ATU-R receiver to adjust its automatic gain control (AGC) to an appropriate level. . . . The duration of C-REVERB1 is 512 (repeating) symbols without cyclic prefix.

G.992.1 at § 10.4.5 (emphasis added). Thus, the signal C-REVERB1 spans 512 DMT symbol periods. Section 10.5.2 describes the signal R-REVERB1, which is transmitted by the ATU-R:

> R-REVERB1 is a periodic signal, without cyclic prefix, that is transmitted consecutively for 4096 symbols.

G.992.1 at § 10.5.2 (emphasis added). Thus, R-REVERB1 spans 4096 DMT symbol periods, not only a single symbol period.

53. Likewise, G.992.1 states explicitly that the SEGUE1 signal is never limited to one DMT symbol period. Section 10.6.1 states that "[t]he duration of C-SEGUE1 is 10 (repeating) symbol periods," and section 10.7.1 states that "[t]he duration of R-SEGUE1 is 10-symbol periods," which means that neither SEGUE1 signal is limited in time to a single DMT symbol period. *See* G.992.1, §§ 10.6.1, 10.7.1.

54. Furthermore, '686 patent states that "the Average Reverb Signal contains the power levels per tone, up to, for example, 256 entries, detected during the ADSL Reverb signal." '686 patent at col. 4:31-33. As would have been recognized by a person having ordinary skill in the art at the time of the alleged invention, and as explained above, the ADSL REVERB signal has a duration that far exceeds the single DMT symbol period.

55. The claims use of both "at least one" and "one" in different independent claims of the '686 patent further adds the ambiguity of what was intended by this claim term.

56. The prosecution history also does not provide any insight as to what is intended by the limitation "each bit in the diagnostic message is mapped to [at least one / one] DMT

symbol." In an attempt to overcome the prior art, the patent owner simply added this language without any explanation as to its intended meaning. *See* '686 File History, January 12, 2007 Amendment and Remarks.

57. For these reasons, I am of the opinion that this claim limitation is indefinite.

**B. Family 6 Patents**

**1. "FIP setting," "FIP value," and "interleaver parameter value"**

| **"FIP setting"** | | |
|---|---|---|
| **Claim(s)** | **Plaintiff's Position** | **Defendants' Position** |
| '835 Patent, Claims 8, 10, 24, 26<br><br>'112 Patent, Claim 8 | Plain and ordinary meaning. No construction necessary. | forward error correction and interleaver parameters characterized by the set of parameters for codeword size in bytes, number of information bytes in a codeword, number of parity or redundancy bytes in a codeword, and interleaver depth in number of codewords |

| **"FIP value"** | | |
|---|---|---|
| **Claim(s)** | **Plaintiff's Position** | **Defendants' Position** |
| '835 Patent, Claims 8, 24 | Plain and ordinary meaning. No construction necessary. | numerical value of codeword size in bytes, number of information bytes in a codeword, number of parity or redundancy bytes in a codeword, or interleaver depth in number of codewords |

| **"interleaver parameter value"** | | |
|---|---|---|
| **Claim(s)** | **Plaintiff's Position** | **Defendants' Position** |
| '835 Patent, Claims 10, 26<br><br>'162 Patent, Claim 8 | Plain and ordinary meaning. No construction necessary. | the numerical value of the interleaver depth in number of codewords |

I understand that the parties dispute the constructions of "FIP setting," "FIP value," and "interleaver parameter value" which are in the above-listed claims of the Family 6 Patents. I

understand that the Plaintiff contends that these terms should be afforded their "[p]lain and ordinary meaning. No construction necessary." It is my opinion that the terms "FIP setting," "FIP value," and "interleaver parameter value" were not terms of art at the time of the alleged invention and did not have a generally understood meaning.

58. The Family 6 Patents define the initialism "FIP" as "FEC and Interleaving Parameter." '162 Patent at 3:33-36. While a person of ordinary skill in the art would have generally understood that the processes of forward error correction encoding and interleaving are usually governed by certain parameters, a person of ordinary skill in the art would have been unfamiliar with the particular initialism "FIP" as used in the Family 6 Patents. For example, I had not seen the term "FIP" used to refer to FEC and interleaving parameters before I read the Family 6 Patents. Because the Family 6 Patents specially define the term "FIP," a person of ordinary skill in the art would have understood the Family 6 Patents to be referring to particular FEC and interleaving parameters as explained in the Family 6 Patents.

59. A person of ordinary skill in the art would accordingly look to the specification of the Family 6 Patents to understand the scope of the terms "FIP setting," "FIP value," and "interleaver parameter value." Although there may be many parameters relevant to the processes of FEC encoding and interleaving, the Family 6 Patents specify four particular parameters when discussing the "FIP settings" and "FIP values." In particular, the Family 6 Patents describe the set of parameters as codeword size in bytes, number of information bytes in a codeword, number of parity or redundancy bytes in a codeword, and interleaver depth in number of codewords. *See, e.g.*, '162 Patent at 2:10-22, 3:33-49, 13:43-47.

60. A person of ordinary skill in the art would have further understood that there may be many potential "interleaver parameter values" and that there are many ways that one could

interleave a set of bits. A person of ordinary skill in the art therefore would not understand the term to generally have a well-defined meaning outside the context of the Family 6 Patents.

61. Accordingly, a person of ordinary skill in the art would have looked to the specification of the Family 6 patents to understand the term "interleaver parameter value." A person of ordinary skill in the art would have then understood that, among the defined FIP values, the value relevant to an interleaver parameter value is a numerical value associated with interleaver depth, which as defined in the Family 6 Patents is "interleaver depth in number of codewords." *See, e.g.*, '162 Patent at 2:10-22, 3:33-49, 13:43-47. The Family 6 Patents define no other units for interleaver depth other than codewords.

62. For these reasons, it is my opinion that "FIP setting," "FIP value," and "interleaver parameter value" were not terms of art at the time of the alleged invention and did not have generally understood meanings.

I declare under penalty of perjury that the foregoing is true and correct. Executed this 14th day of March, 2022.

Bruce McNair